

Purpose vs Performance: What does marine protected area success look like?

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Abstract:

Marine protected areas (MPAs) are an increasingly deployed spatial management tool. MPAs are primarily designed for biodiversity conservation, with their success commonly measured using a narrow suite of ecological indicators. However, for MPAs to achieve their biodiversity conservation goals they require community support, which is dependent on wider social, economic and political factors. Despite this, research into the human dimensions of MPAs continues to lag behind our understanding of ecological responses to MPA protection. Here, we explore stakeholders' perceptions of what MPA success is. We conducted a series of semi-structured interviews and focus groups with a diverse group of stakeholders local to a South Australian MPA. What constitutes success varied by stakeholder group, and stakeholders' stated understanding of the purpose of the MPA differed from how they would choose to measure the MPA's success. Indeed, all interviewees stated that the primary purpose of the MPA was ecological, yet almost all (>90%) would measure the success of the MPA using social and economic measures, either exclusively or in conjunction with ecological ones. Many respondents also stated that social and economic factors were key to the MPA achieving ongoing/future success. Respondents generated a large range of novel socio-economic measures of MPA success, many of which could be incorporated into monitoring programs for relatively little additional cost. These findings also show that success is not straightforward and what constitutes success depends on who you ask. Even where an MPA's primary ecological purpose is acknowledged by stakeholders, stakeholders are likely to only consider the MPA a success if its designation also demonstrates social and economic benefits to their communities. To achieve local stakeholder support MPAs and associated monitoring programs need to be designed for a variety of success criteria in mind, criteria which reflect the priorities and needs of the adjacent communities as well as national and international conservation objectives.

Highlights:

- What constitutes MPA success is complex and perceptions of success vary by stakeholder group
- Stakeholders are likely to judge the success of an MPA using criteria other than the stated designation purpose
- Local communities may fail to consider an MPA successful unless it demonstrates social and economic benefits in addition to ecological ones
- Achievement of biological success can be dependent on achievement of socio-economic successes
- We provide a large list of novel, stakeholder generated, success indicators which could be used in monitoring programs

Key words:

Stakeholders, conservation, marine management, community engagement, biodiversity, stewardship

1. Introduction

Marine protected areas (MPAs) are an increasingly used management tool in marine and coastal ecosystems around the world (Pita et al., 2011). Within an MPA activities are managed or prohibited in order to protect or restore features of interest (Kelleher and Kenchington, 1992). MPAs vary in their levels of protection from multiple-use parks in which only certain activities are restricted, to strictly no-go areas where all forms of extractive, depositional and recreational uses are prohibited. Evidence for the conservation benefits of MPAs have been widely published, with the greatest benefits usually attributed to areas with the highest levels of protection (Edgar et al., 2014). MPAs have been shown to harbour increased biodiversity, as well as increases in the density and average size of previously targeted species (Alcala and Russ, 1990; Halpern, 2003). MPAs can also protect habitats, critical ecosystem functions and promote long term ecosystem resilience (Gell and Roberts, 2003; Hughes et al., 2005; Micheli et al., 2012). There is growing evidence of the ability of some MPAs to enhance fisheries through the spill-over of larvae or adult fish into adjacent or

74 nearby fishing grounds (Beukers-Stewart et al., 2005; Russ and Alcala, 2011; Harrison et al.,
75 2012). Today, >14,000 MPAs have been designated, covering approximately 4.1% of the
76 oceans and 10.2% of coastal areas under national jurisdiction (UNEP-WCMA & IUCN, 2016)
77

78 While MPAs are most often designated for the purposes of biodiversity conservation, there
79 are also social and economic consequences related to their establishment (Agardy, 1993;
80 Farrow, 1996; Pomeroy et al., 2006; Wahle and Lyons, 2003). MPAs have been shown to
81 benefit local communities through increased economic opportunities and alternative
82 livelihoods provision (Rees et al., 2015), but there have also been negative effects on
83 communities as a result of increasing conflict, or inequitable distribution of wealth (Bennett
84 and Dearden, 2014; Christie et al., 2003). Research into the social context of MPA planning
85 and management has been increased in recent years. In particular, there is growing evidence
86 that stakeholder support of MPAs, including their input to the planning, designation and
87 management processes, plays a critical role in enabling MPAs to achieve their conservation
88 goals (e.g. Di Franco et al., 2016; Himes, 2007). However, our understanding of the human
89 dimensions of MPAs, that is, how communities respond to MPA establishment and how these
90 responses impact upon MPA performance, still lags behind our understanding of the
91 ecological aspects of MPAs (Badalamenti et al., 2000; Christie, 2004).
92

93 To date, success of MPAs has generally been measured in terms of meeting biological
94 objectives, such as increased biodiversity or biomass (Alcala and Russ, 1990; Harrison et al.,
95 2012; Russ and Alcala, 2011). Whilst understandable, given that one of the main drivers for
96 MPA creation is the International Convention on the Conservation of Biodiversity (CBD), this
97 narrow view of success does not incorporate any of the human dimensions of MPAs. This
98 narrow view also fails to take into account the CBD's revised strategy and Aichi targets, of
99 which number 11 clearly states that protected areas should be "effectively and equitably
100 managed", meaning that planning and management of MPAs needs to incorporate these
101 human dimensions (UNEP 2010).
102

103 An appreciation is needed of how stakeholders, whose support is required to achieve MPA
104 conservation goals, measure success and how that varies between stakeholder groups.
105 Whilst the different perceptions of MPA success among stakeholder groups have received

some consideration (Himes, 2007), as yet unexplored is whether stakeholders' understanding of the purpose of an MPA aligns with how they would measure its performance. It has been argued that for MPAs to be successful, all stakeholders must be aware of and agree on MPA goals and expectations (Abecasis et al., 2013; Himes, 2007). Understanding the extent to which stakeholder views of success align with an MPA's stated goals will indicate the level of congruence between governance institutions and local stakeholders. This understanding can be useful for community engagement activities designed to build support for the MPA, as well as for developing monitoring programs that capture aspects of importance to stakeholders. Exploring how a group of stakeholders view both an MPA's purpose and its successful performance can also provide insight into the role education/awareness raising (i.e. creating understanding) of purpose can have on shaping expectations of performance. Ultimately, understanding how stakeholders perceive success should feed into the development of MPA designation plans and management strategies to maximise the potential realisation of multiple success types and thus more equitable experience of MPA success across stakeholders.

Here we explore MPA success with a diverse group of stakeholders adjacent to a recently established MPA in South Australia. We consider how different stakeholder groups: 1) perceive the purpose of the MPA, 2) how this perceived purpose compares to what measures stakeholders would choose to judge the success of the MPA, 3) which specific indicators stakeholders suggest could be used to measure the success of the MPA, and 4) how stakeholders think the success of the MPA could be enhanced in the future.

1.1 Study site

South Australia has 19 multiple use marine parks designed to protect and conserve marine biological diversity and marine habitats, as designated under the South Australian Marine Parks Act 2007 (South Australian Government, 2007). Together these parks form the South Australian Representative System of Marine Protected Areas (DEH, 2004), and encompass the major ecosystems and habitat types found in South Australian waters. Each park comprises a series of 'use' zones graded from general use through to highly restricted 'no go' sanctuary zones (DEWNR, 2012b). The State's lead environmental agency, the Department of

Environment Water and Natural Resources (DEWNR), led the process of park implementation and now has oversight of park management (DEWNR, 2012a).

Achieving the 19 MPAs for South Australia was a long and protracted journey taking 14 years and traversing a highly politicised process. Kirkman and Shepherd (2015) give an overview of the opposition, strategies and strength mustered to resist the designation and formalisation of marine parks led primarily by a powerful fishing lobby. The process commenced in 1998 with the South Australian state government committing to a representative system of Marine Protected Areas within five years (South Australian Government, 1998). In 2001 the 2003 target was extended by four years in a revised vision statement (Government of South Australia, 2001 #264}. In 2004 the Blueprint for the South Australian Representative System of Marine Protected Areas heralded an establishment date of 2010 (DEH, 2004). The state's strategic plans of 2007 and 2011 both refer to the importance of and implementation of the marine parks. Between 2008 and 2012 extensive work was undertaken (scientific studies, planning and design) to deliver the parks. Comprehensive efforts to engage the public ran in parallel with the research and design. In 2012 the parks were finally approved. However, as a result of political and sectoral wrangling the original vision and design principles of comprehensive, adequate and representative (CAR) coverage of habitat types across the state waters was heavily compromised in the final 2012 result (Kirkman and Shepherd 2015).

The Encounter Marine Park was the first of the South Australian marine parks to be piloted under the multiple-use system. It encompasses the waters off southern metropolitan Adelaide and the Fleurieu Peninsula, covering an area of 3,119 km² (Fig. 1). The Encounter Marine Park pilot process commenced in 2002, with a draft zoning plan released after public consultation in 2005. The outer boundaries of the Encounter Marine Park were formally proclaimed in 2009 after further consultation with key stakeholders. Marine park local advisory groups, comprised of regional stakeholders and representatives, were established that same year to provide input into the management planning process, with the current Encounter Marine Park zones and associated management plans implemented in 2012 (Kirkman, 2013).

The Encounter Marine Park is adjacent to Kangaroo Island and the southern Fleurieu Peninsula region (comprising the Local Government Associations of Victor Harbor, Yankalilla and Alexandrina). This region has traditionally been a holiday and retirement destination but more recently there has been much faster population growth than that of metropolitan Adelaide (ABS, 2015). Fishing, both commercial (aquaculture and wild catch) and recreational are significant to the region's economy. Key target species include southern rock lobster, black lip and green lip abalone, western king prawn, sardines, snapper, King George whiting, southern garfish, southern calamari and blue swimmer crab. A number of commercial and recreational fishing practices are used including netting (trawl, gill or mesh, hauling and dab nets), line fishing (rods and lines, hand lines, longlines and droplines), traps and pots and hand held implements (rakes, nets) (PIRSA, 2015).

2. Methods

We engaged stakeholders in either individual, semi-structured interviews or focus groups. In many ways, focus groups and in-depth interviews are very similar and can be equally effective in answering certain research questions (Crabtree, Yanoshik et al. 1993). Both interviews and focus groups draw upon participants' attitudes, beliefs, and experiences (Morgan and Krueger 1993). We chose to use a combination to reflect the context of the groups we targeted and to maximise participation with the available resources we had.

One-to-one interviews allowed for detailed, in-depth and controlled questioning. Our interviews focused on individuals who held a professional role in the designation and/or ongoing management of the MPA. We interviewed them during the day, as part of their job. These individuals were not necessarily geographically clustered and challenges of co-ordination across multi-organisations and work schedules made bringing them together in focus groups less feasible. We also anticipated they would provide substantial detail, requiring more individual time, and that they may have been more constrained in the information they felt they could provide if they have been in a (unavoidably) mixed-institution focus group.

200 Interviews took between 40 minutes to one hour and were recorded using a digital voice
201 recorder for later transcription. During the interview process additional potential participants
202 were identified. Where appropriate, these potential participants were contacted via email
203 and/or phone and invited to participate (snowball sampling). Forty-one face-to-face
204 interviews were conducted between April and November 2015.

205

206 Four focus groups of between 7 and 9 people were held between September and October
207 2015 at three regional centres adjacent to the Encounter Marine Park. These focus groups
208 targeted input from the broader community of residents and resource users. Focus groups
209 allowed us to enable more individuals to participate than if we had only conducted
210 interviews, both because multiple individuals were participating at the same time and
211 because community groups were clustered in regional locations so logistically it was more
212 efficient to bring them together as groups. We grouped likeminded participants together
213 (conservation and commercial groupings) within focus groups because groups that consist of
214 individuals that share many of their feelings and experiences provided a more comfortable
215 space for participants to share their views (Morgan and Kreuger, 1993). Indeed several of our
216 focus group attendees said they wouldn't have been comfortable doing an individual
217 interview, but that they were amenable to contributing as part of a group.

218

219 Two of the research team moderated each focus group. One facilitated the group discussion
220 introducing the general issues and asking questions, allowing some flexibility in discussion,
221 and probing or interjecting to keep the conversation focussed. The second scribed key
222 emergent ideas on a screen for the group to track the discussion and managed the digital
223 recorder. While there was some latitude for free discussion of issues the moderator brought
224 the discussion back to the question set to allow for comparison on the guideline questions
225 across groups (see Supplementary Materials).

226

227 Selection of participants was non-random; we targeted individuals that had a record of
228 involvement in the MPA and we aimed to canvass views from a range of different
229 perspectives, including commercial and recreational sectors, conservation and volunteer
230 groups, park management, and local and state government representatives. Participants
231 were selected using a range of strategies. Park management staff and local government

officials known to the researchers were approached. Sectoral, peak body (an advocacy group or trade association) and conservation NGO leaders or representatives were identified via internet searches, as were local volunteer and interest group networks. These groups were sent an email or letter of invitation explaining the goals of the project. A non-response was followed up by a phone call. Advertisements for the focus groups were placed in shop windows (including tackle shops, convenience stores, and tour operators) and on notice boards at shopping centres and libraries in the regional centres surrounding the Encounter Marine Park. An advertisement was also placed in a local newspaper. At our request, representatives of regional councils, conservation, volunteer and sectoral organisations sent an email invitation to their mailing lists. To boost attendance, individuals who expressed a wish to attend the focus group were requested to circulate an invitation to others in their immediate network.

During both interview and focus group sessions participants were asked a series of open-ended questions on the same subject matter. Questions initially explored participants' knowledge of the Marine Park and their understanding of its purpose, then participant(s) were asked as to their perception of benefits and costs (realised or potential) of the Marine Park, whether they believed the Marine Park to be a success and what indicators they might use to measure success (see Supplementary Materials 1 for list of questions). Responses were recorded using a digital voice recorder.

The interviews and focus group discussions were transcribed to a Word document and later uploaded to NVivo. A thematic analysis was undertaken following inductive mapping, where coding and themes were directed by the content of the data. We used a 'scissor and sort' technique by going through the transcript and identifying those sections of it that were relevant to the research question (Stewart *et al.* 2007). The analysis followed a series of processes, with some back-and-forth movement between them. Researchers first familiarised themselves with the content of the transcripts. A coding frame was designed to capture important features of the data and to respond to the research objectives. The data set was then organised into codes. The codes were then read for patterns and emerging themes. Qualitative responses were coded according to their content into a range of broad nodes based on interview questions; perceptions of success, split into three broad

categories: biological (e.g., biodiversity, habitat protection, species abundance), social (e.g., community engagement, education) and economic (e.g., tourism, fisheries); and measures of success. Where directional measures of success were provided (e.g., increased abundance of fish, decreased number of boat strikes on megafauna reported), these were transformed into non-directional indicators. The number of individuals responding to specific themes was recorded (after Stewart *et al.* 2007).

Ethics clearance was obtained from the Flinders University Social and Behavioural Research Ethics Committee on 9 April 2015. All respondents were provided with participant information documents before they decided if they wanted to participate, and all signed consent forms prior to the interview/focus group taking place.

3. Results

Altogether, 73 people participated in the study. This consisted of 41 respondents interviewed individually (Table 1) and 32 respondents who took part in one of four focus groups (Table 2). Of those 73 individuals representation was evenly distributed across three stakeholder groups: government (state and local) (n=24), conservation and community groups (n=26), and fisheries (commercial and recreational) (n=22). All participants had been involved, either directly or indirectly, with the marine park. Engagement included: participating in the initial planning process (including commenting on draft plans; acting on a local advisory group, or the state-wide steering committee); conducting citizen science projects or educational activities; using resources (e.g. commercial and recreational fishing and other recreation activities); campaigning/advocacy; undertaking ongoing monitoring and management.

3.1 Understanding the purpose of the Encounter Marine Park

When asked to describe the purpose of the Encounter Marine Park, all 41 interviewees and all focus groups provided a biological conservation as the primary purpose (Fig. 2). The majority of interviewees (59%, n=24) and all focus groups specifically identified habitat protection. Many other respondents referred to the protection of breeding grounds (without specifying for fish).

296

297 *The marine park is basically to protect the habitat of the animals that are in there, so the*
298 *flora and fauna... to actually protect certain areas and samples of the habitat types that*
299 *actually exist in our waters. Within that there are sanctuary zones for very specialised*
300 *places as samples of those habitats types that are actually set aside for species*
301 *conservation purposes. [ID 16 Environment NGOs and community groups]*

302 *...to provide protection for biodiversity in particular, and also to provide a level of*
303 *protection to the marine environment and ecology from perceived or real threats.*
304 *And also, the line that they trot out is also to preserve pristine habitats from potential*
305 *future degradation or exploitation. [ID 32 Fishing—commercial and recreational]*

306 *Protection of species. I would regard that not just related to fish and the like, but also*
307 *seaweeds and anything that's growing in the area, which is being degraded [...]. [Focus*
308 *Groups B (Conservation interests)—Victor Harbor]*

309

310 There was also emphasis placed on the conservation of fish or fish stocks, with five
311 interviewees (12%) and one focus group specifically stating the protection of fish as a
312 purpose of the park.

313

314 *To prevent overfishing and restore the fish population, which has become degraded over*
315 *the years because of more and more people taking fish out, either as amateurs or*
316 *commercial fishing. [ID 15 Environment NGOs and community groups]*

317

318 One fifth of all interviewees (n=9; 22%) and two focus groups also identified social and/or
319 economic purposes for the marine park. Stated socio-economic purposes or 'community
320 benefits' included primarily education, recreation and tourism. Of note, these were often
321 referred to as a secondary or added purpose.

322

323 *Primarily a conservation asset, so looking to set aside some of our healthier areas for*
324 *long-term conservation benefit, that's our primary objective. The secondary*
325 *aspirations really are around ensuring people get to enjoy, understand and use the*
326 *Marine Park sustainably. [ID 3 State Government—Environment]*

327 *It's about keeping what's there (wildlife) and encouraging more. Looking after*
328 *wildlife, basically. It's really an educational campaign as well; I think there's two parts*
329 *to it. It's the saving and the learning! [ID 37 Local Government]*

330 *Primarily that marine parks are there to conserve all parts of marine biodiversity in*
331 *that part of the bioregion they're in... There's a whole range of other purposes... if we*
332 *can encourage some good, well thought through marine nature-based tourism*
333 *opportunities and stimulate those [local] economies. [ID 6 State Government—*
334 *Environment]]*

335 Participants stated understanding of the purpose of the Marine Park correspond tightly to
336 the official purpose outlined in the Marine Parks Act (South Australian Government, 2007)
337 which highlights the objects of the Act are to:

338 *“to protect and conserve marine biological diversity and marine habitats by declaring*
339 *and providing for the management of a comprehensive, adequate and*
340 *representative system of marine parks”*

341 And to assist in:

342 *“(i) the maintenance of ecological processes in the marine environment;*
343 *(ii) the adaptation to the impacts of climate change in the marine environment;*
344 *(iii) protecting and conserving features of natural or cultural heritage significance;*
345 *(iv) allowing ecologically sustainable development and use of marine environments;*
346 *(v) providing opportunities for public appreciation, education, understanding and*
347 *enjoyment of marine environments.”*
348

349 Thus participants demonstrated that they had a very good understanding of the goals of the
350 MPA, with its primary focus on biological conservation and additional aspects of ecological
351 sustainability and public appreciation.

352

353 **3.2 Opinions about the marine park's success**

354

355 When asked if the Encounter Marine Park has been a success, multiple aspects of success
356 across a biological, social and economic spectrum were generated. Responses demonstrate
357 that stakeholders have a range of interpretations of what success is, with different
358 respondents focusing on different aspects they believe to have been or not been successful.
359 Responses also highlighted that success types could occur or accumulate over different
360 timescales.

361

362 Indeed, many people suggested that it was too early to tell (n=24 interviewees, 59%, all focus
363 groups) if the marine park had been a success. Several of those that said it was 'too early' to
364 tell made specific reference to biological successes and the need to await monitoring results.

365 *It's years down the track, I think it's too early [...]. [DEWNR] are still setting up their*
366 *monitoring programs [to gather] baseline data collection inside and outside sanctuary*
367 *zones. [Focus Group C Conservation interests—KI]*

368 *I think it's impossible to assess in the absence of constructive feedback from the*
369 *monitoring, evaluation and reporting program. You can't make a call, because I don't*
370 *know of the data, what data's being collected, what were the baselines, what's*
371 *changed over time, some impacts are not going to be realised for 10, 15, 20 years. So*
372 *I think that's an impossible [call]. It's going to take a long time for the data to be*
373 *collected. [ID 17 Environment NGOs and community groups]*

374 Many other respondents thought the park was already successful, at least certain aspects,
375 (17 interviewees, 41%, and 2 focus groups). However, they focused on non-biological
376 measures of success. Eleven interviewees (27%) and two focus groups (one conservation, one
377 fisheries) suggested that the existence of the Encounter Marine Park was, in its own right, a
378 success. Eight interviewees (20%) reported that it was a success because it had raised
379 awareness of the marine environment and the need to conserve it.

380 *I would think in the main, the concept of marine parks has been successful..... we're*
381 *now talking about something we weren't talking about before, so I think all the*
382 *promotion and education around them has been very successful. [ID 40 Local*
383 *Government]*

384 *The presence of the marine park has started to open peoples' eyes, their perspectives*
385 *have changed... [ID 21 State Government—Environment]*

386

387 Some respondents discussed an increased pride of place (n=5 interviewees) and two
388 individuals provided specific examples of how the designation of the Encounter Marine
389 Park already has affected the perceived value of the region.

390 *I know that one of the bus drivers who take bus tours around the island have said*
391 *that, they've always stopped at Pelican Lagoon to show people the scenery [...], and*
392 *occasionally people get out the bus and take a photo. Whereas now he stops at the*
393 *same place and says, 'this is now a marine park sanctuary zone' and everyone gets*
394 *out the bus to take a photo of it, just because it's a sanctuary zone. [ID 35 State*
395 *Government—Environment]*

396 *As a success already, I work at Seal Bay Conservation Park [...]. We talk about the*
397 *marine park and all that sort of stuff. There is nothing but positive feedback about*
398 *having the marine park. [Visitors] just go off with great big smiles [Focus Group C*
399 *Conservation interests—KI]*

400
401
402
403 There was also evidence of community support for the Encounter Marine Park and the
404 waning of negative 'noise' about it since implementation was offered as an indication of
405 success s by eight interviewees (20%) and one focus group.

406 *I think it has been a success since it started, but when it was proposed it wasn't. Since it*
407 *became official... I've definitely had almost no one coming in to complain about them, I*
408 *can't think of a single complaint coming through the council once they were in place, and*
409 *at council everyone comes in to complain...! You rarely hear when something's good. [ID*
410 *8 State Government—Environment]*

411 MPA planning processes invariably involve some compromises, and these compromises can
412 leave some stakeholders dissatisfied with the result. Here, it was the opinion of roughly one
413 quarter of interviewees (n =10, 24%) and two focus groups that the Encounter Marine Park
414 was not a success because of inadequate sizing/zoning within the park and some (n= 6) linked
415 this directly to socio-economic and political pressures.

416 *I'm not sure that we were completely successful in securing a zoning plan that will*
417 *provide adequately for all the biodiversity conservation needs of the Encounter Marine*
418 *Park, and a lot of the other marine parks, into the future. In other words I don't think we*
419 *got the optimal zoning plan this time around, on this pass. [ID 6 State Government—*
420 *Environment]*

"...in practical terms a lot of these sanctuary zones may actually be too small to have ecological benefits, through too much compromise in the past. And that's just purely looking from an ecological perspective, and of course there have been a lot of social, political, economic pressures to make that happen, that they are actually fairly small." [ID 26 State Government—Environment]

"...but [current sanctuary zones] are not representative. The areas you needed should have been close to the shore of the mainland, but these were too political so they didn't go through." [ID 20—commercial and recreational]

Thus whilst respondents suggest, in concurrence with scientific evidence, that it will take a number of years to know if the MPA has been a success in terms of as delivering the biological goals, they provide lots of evidence of it already achieving some 'social' success. Maintaining the MPA long enough to enable the accrual of biological success will arguably be down to ongoing social success and local politics. Thus, identifying, understanding, enhancing and capitalising on these social success is an important aspect of MPA management.

3.3 Measuring success

When asked how they would measure the success of the marine park, the focus was again much broader than biological conservation. Respondents provided a range of measures, which we placed into three broad categories: biological, social, economic, see Table 4 for a selection, and Supplementary Materials, Table 1 for a full list. Biological (n=37 interviewees, three focus groups) and social measures (n=36 interviewees, all focus groups) were the most commonly provided, though economic measures were still suggested by over half of the interviewees (n=21) and all focus groups (Table 3, Fig. 2). Most of the time interviewees and focus groups provided both biological and social or economic measures of success (n=34 interviewees, 88%; and three focus groups). Overall, social or economic measures of success were provided by slightly more respondents than biological ones: 39 interviewees (95%) and all four focus groups provided at least one social or economic measure of success compared to 37 interviewees (90%) and 3 focus groups providing at least one biological one. Four

interviewees and one focus group provided exclusively social or economic measures of success, compared to just one interviewee that offered only biological measures.

That social, and to a lesser extent economic, measures of success were so frequently mentioned, indeed slightly more often than biological measures, is at apparent odds with the respondents stated understanding of the goals of Marine Park, which was primarily biological conservation. This disparity appears even greater when the specific measures are considered: there were a total of 64 separate measures of success provided, including 8 biological, 19 economic, 28 social and 9 social-economic measures. The much larger diversity of social, economic and socio-economic measures may reflect the complexities of socio-economic success, but it may also represent respondent's greater understanding of the socio-economic context, in which they are immersed, than the more removed biological one.

When suggesting measures, many respondents provided a particular direction by which they would determine success or failure (e.g., increased abundance of fish versus decreased abundance or no change over time). Because the direction by which success is measured has the potential to vary by stakeholder group or by individual, listed measures are provided as non-directional (Table 4 and Table S1, Supplementary Materials; see Discussion section 4.2).

Suggested biological measures of success included: number of species present, size and abundance of fish, and degree of habitat damage.

Sea grasses coming back, more fish coming back in, more marine life – coming back to what it was, I guess. Has it improved under the water since it's been implemented? I don't know. So [an increase in the extent] of sea grasses. With [the sea grasses] there it would attract the marine life back in again: everything that lives out in the sea... It's not just fish, I suppose the quickest measurement is the numbers of the fish stock overall [inside and outside the marine park]. [ID 24 Local Government]

...whether species increased or habitat improved, stuff like that, and you may compare it to similar places that aren't protected. [ID 38 State Government—Environment]

486 *To be able to demonstrate that we've preserved or protected or done something to*
487 *conserve biodiversity, we have to measure some biophysical parameters of marine parks,*
488 *so some measure of how well they're doing with respect to the biodiversity that occurs*
489 *there, and the conditions of the environment that occurs there. [ID 21 State*
490 *Government—Environment]*

491

492 Suggested social measures of success included: levels of community support expressed for
493 the marine park, levels of restrictions on activities considered harmful to conservation
494 objectives, levels of voluntary compliance/violation of rules, levels of stewardship and
495 community involvement in park management, amount of positive commentary about the
496 park in the media, and level of incorporation of the marine parks into local school curriculum.

497

498 *That's another way to measure success, and of course the other thing is, to measure*
499 *community buy-in: does the community support the marine parks, and does the active*
500 *community support the marine parks? [ID 19 Fishing interests—commercial and*
501 *recreational]*

502 *Compliance is an issue I think [...]; compliance would be a good indicator [of success].*
503 *[Focus Group C (Conservation Interests)—KI]*

504 *Looking at the community involvement, so number of volunteers, even vandalism to*
505 *signs... [ID 3 State Government—Environment]*

506 Suggested economic measures of success included: quantity of catch (fisheries), change in
507 tourism activity, value of real-estate adjacent to the park, development of new businesses,
508 revenue of existing businesses.

509

510 *Economically, if commercial fishing [is able] to continue into the future, that would be*
511 *good; that would be the proof of the pudding. There should be a flow from marine*
512 *parks into the fishing areas. [ID 27 NGO and community groups]*

513 *Tourism – the number of tourists could be a measure, and the number of residents,*
514 *but how do you know if migration is due to the marine park? [ID 20 Fishing*
515 *interests—commercial and recreational]*

516 *If you look at interstate examples where there's been marine parks in place for some*
517 *time, you'll start to see – even in real estate ads – 'great house next to a marine park'.*
518 *You know you've got a measure of success when someone's using it as an asset in a*
519 *real estate sale. [ID 35 State Government—Environment]*

520 *The next thing to look at would be economic, and I think the measure of that would be*
521 *seeing allied industries or business areas grow, or at least not decline. I think the*
522 *difficulty with that is because there are such fine linkages between what a marine park*
523 *means and how that actually connects to the business of a hardware and fishing tackle*
524 *store, or a fish and chip shop or even the fuel station, makes it very difficult. [ID 28 Local*
525 *Government]*

526 As well as highlighting that respondents considered a much greater variety of success
527 measures than biological, responses also demonstrate an understanding of the fact that
528 measuring or demonstrating some these successes, or lack of them, will be very challenging.

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531 **3.4 Weighting of measures**

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533 Not all successes are equal and knowing which ones are more valuable to stakeholders can
534 help guide discussion and inform the inevitable trade-offs when planning and managing
535 MPAs. When asked to identify the most important measurement criteria to gauge success of
536 the Park, nearly one quarter of our interviewees (n=10; 24%) explained that the
537 environmental (biological/ecological) criteria were on a 'level playing field' with socio-
538 economic. They could not differentiate a weighting between them as they believed the
539 criteria were interconnected, highlighting the need realise one success type to support
540 achievement of another.

541

542 *It's a hard one, as they're so interlinked. As a scientist I'm of course inclined to say the*
543 *ecological thing is important, but of course you can't have ecological outcomes without*
544 *support from the community and general public. [ID 26 State Government—*
545 *Environment]*

546 *I would put them all equally. All of them have a different outcome, a different reason for*
547 *needing that data. [ID 31 Local Government]*

548 *It's really tricky because they're so intertwined. Without the ecological outcomes it will*
549 *be harder to garner the community support, and without community support you're*
550 *going to have compliance issues, which can undermine ecological outcomes. [ID 13*
551 *Local Government]*

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553

554 Nine interviewees (22%) said that while they would select environmental
555 (biological/ecological) measures as the most important, they also recognised the substantial
556 importance of socio-economic measures.

557 *It comes back to the purpose [of the park]... [Top ranked would be] the number of*
558 *species identified as significant, are they still there, and are those habitats still*
559 *functioning as they were found? Then it'd be the social. [ID 17 NGO and community*
560 *groups]*

561 *Number one has to be – because we can't measure the success of the parks without this*
562 *– number one has to be some biophysical measure of the trends of protecting*
563 *biodiversity. However, I wouldn't put it so far ahead that we exclude doing anything else.*
564 *So then equal to that I think we need those measures of social, economic and even*
565 *cultural change, and I'd rank those equally around trying to understand how the*
566 *community's tracking and where it wants to go. [ID 21 State Government—Environment]*

567 Five interviewees (12%) argued that the socio-economic success measures were the most
568 important because of the wider implication that they have.

569 *Socio-economic is the most important. That's because of the politics.... We need to be*
570 *able to demonstrate very quickly that this has had a neutral impact [ID 3 State*
571 *Government—Environment]*

572if we don't have that second bit, the fact that people appreciate it and understand
573 it, then they're not going to protect things for very long because we'll get rid of them.
574 So I suppose to make sure that they are there, we need to concentrate on the social bit,
575 even if that may not technically be the most important thing. The political side of things
576 is [therefore] probably more important than the environmental side of things. [ID25
577 *State Government—Environment]*

Thus, while our respondents universally acknowledge the primary purpose of the Marine Park to be biological, they certainly do not universally think that biological success is the most important. Rather respondents repeatedly identified an appreciation of the need to achieve social success in order to obtain biological success, and the importance of politics in doing so.

3.5 How to increase the success of the MPA

All suggestions of increasing the future success of the MPA related to social and economic aspects of the Encounter Marine Park and suggest an inherent understanding that success of all types requires socio-economic investment. Many interviewees and all three focus groups identified interwoven aspects of enhanced communication, education, awareness raising, and community engagement/outreach and as being central to improving the success of the MPA. Communication, in particular, was considered essential for effectively engaging the community and improving stakeholder buy-in. Our respondents discussed three main aspects of communication that need improving to increase the Marine Park's success: improving information outputs to publicise the Encounter Marine Park—to sell the concept of the marine park and to highlight successes; publicising management and monitoring program results because monitoring data is essential to promote the park's achievements; and the need for transparency and openness.

And then also building in [the message], 'the marine environment's great, so we're protecting it'. That's something that's missing at the moment, a lot of the marine parks' information is purely about the rules, where you can and can't fish, and it's all about recreational fishing, it's not about 'these are the special things that are the reasons we've got these sanctuary zones here'. It needs to be about concentrating on what you can do, rather than what you can't. [ID 25 State Government—Environment]

Just more publicity, more awareness, more signage, and more monitoring [...]; monitoring so the results do become known. I think the impacts [of activities] need to be monitored, and we'd like to hear the results of that as well. [ID 27 Environment NGOs and community groups]

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... highlighting successes; highlighting community buy-in, highlighting stakeholder engagement... [ID 16 Environment NGOs and community groups]

I'd like to know what the monitoring regime [is]. I think the monitoring regime should be on a public website so that people of any level of interest can have access to the information... It may be a failure, but let's be open about that and let's have a look at that information. [ID 18 Local Government]

Discussions around education involved both the more formal, traditional education routes, such as working directly with schools, and more general awareness raising through community engagement and outreach.

I've always been a big one for educating the young people, so getting into schools and setting up a proper marine education program that addresses the needs for teachers to teach about marine life in South Australia... [ID 10 Environment NGOs and community groups]

I think we need to be better at communicating the things we are trying to conserve and why... working with the community, so they are part of the monitoring and the management. [ID 22 State Government—Environment]

Multiple respondents (n=8 interviewees, 20%; and 2 Focus Groups) acknowledged that in the end everything comes back to money. Regional economic development within communities attributable to the marine park (such as tourism ventures or eco-labelling of food products) were felt would help engender support for the Encounter Marine Park. In addition, it was considered that adequate resourcing will be essential to sustain management functions of the Encounter Marine Park.

I don't think there's enough discussion of what are the commercial opportunities that will ultimately contribute to sustainable resource use... I'm thinking of the tourism side of things, I'm not talking about commercial fishing... In the marine park you do need to seriously look at what are the commercial tourism opportunities, both to start the

643 *process of seeing another value of the park. [ID 17 Environment NGOs and community*
644 *groups]*

645

646 *Funding, everything hinges on funding; whether we look at stewardship, or compliance*
647 *or the monitoring side, all of that needs to be kept up or increased and that requires*
648 *funding. [ID 26 State Government—Environment]*

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650 *If there were more resources available you could do more from a compliance point of*
651 *view, you could do more from an education point of view: you could put on more*
652 *activities for kids, you could put in more interpretive signs if that's what you decided you*
653 *needed. But everything is now limited by resources. [ID 35 State Government—*
654 *Environment]*

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656 That respondents provided only socio-economic means to increase future success of the park
657 reflects the reality that MPAs are social constructs that need social, political, and economic
658 support to be successful. Results demonstrate the importance of the human dimensions, the
659 need to raise awareness so that people will value the Marine Park and in turn galvanise
660 enough political support to ensure sufficient and ongoing funding for education, monitoring
661 and compliance. The link to politics for the success of the park, both past (including original
662 designation) and ongoing is inferred multiple times (n=13 interviewees and all focus groups)

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664 *...in my cynical moments I wonder how much it was partly a political choice to have a*
665 *park there simply because of its proximity to Adelaide, and there's a lot of people on the*
666 *Fleurieu too. [ID 1 Environment NGOs and community groups]*

667

668 *...from a management point of view, if your political leaders see your program as that*
669 *fantastic then they're likely to keep funding it into the future. [ID 3]*

670

671 *If we have a political environment that is regressive with marine parks with respect to*
672 *marine parks, then I think that it could go pear-shaped pretty quickly. If the current*
673 *political environment prevails then I think the future looks good. [ID 6 State*
674 *Government—Environment]]*

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The 10-year review will be challenge if the political animosity has not been resolved... if you had bipartisan support from both the major parties, that would just make things so much easier... [ID 13 Local Government]

4. Discussion

This study examined MPA success, using the Encounter Marine Park in South Australia established in 2009. Through semi-structured interviews and focus groups with 73 respondents from three main stakeholder groups, we found that stakeholder understanding of the purpose of a park differs from how they would measure its successful performance. We found that stakeholders consider that social and economic aspects of MPAs to be as important for current success as biological aspects. Moreover, stakeholders were united in expressing that future success of the MPA depends on social and economic aspects, and they highlighted the role of politics in determining success.

4.1 Perceptions of purpose versus perceptions of performance

Success is a complex, multifaceted concept, which very much depends on an individual's perspective. In the literature, MPAs, in general, are considered successful when they are seen to have achieved/be achieving their purpose (i.e., their stated aims and objectives) (Pollnac et al., 2001; Pomeroy et al., 2005). All of the respondents in this study (interviewees and focus group participants) identified the purpose of the Encounter Marine Park to be biological. Only around one quarter of respondents also provided secondary social or economic purposes. However, when asked how they would measure the Park's success, only one respondent provided exclusively biological measures. All other respondents, both interviewees and focus group participants, specified social and or economic measures of success, exclusively or in addition to biological measures. Stakeholders identifying social and economic measures of success is, in itself, unremarkable. That MPAs can have substantial social and economic implications, both positive (Alder et al., 2002) and negative (Mayo-Ramsay, 2014; Yates and Schoeman, 2015), is well established. What is interesting, and important, is that whilst our

respondents clearly identified the primary purpose of the designation of the park as biological conservation, they would measure if the MPA was successful based on social and economic effects as readily as the biological ones. For some respondents these economic and social measure of success were more important than the ecological ones, despite the ecological measures relating directly to the goals of the MPA. Thus, it seems that what stakeholders consider 'success' may not always be related to the purpose the MPA was designated for, even when stakeholders have been educated as to what that purpose is.

4.2 Measuring success

Quantifiable measures (indicators) are an essential aspect of effective monitoring programs, enabling us to assess if MPAs have achieved their objectives. While the literature on ecological and biophysical indicators is extensive, the literature on social and economic indicators has lagged behind and is generally less well developed (Pomeroy et al. 2006). 'Best practice' guidelines exist for socio-economic indicators, which are intended for general use and are presented as broad guidance regarding the development of such indicators (e.g., Bunce et al. 2000, Hockings et al. 2006, but see Pomeroy et al. 2004). In contrast to these broad guidelines, respondents here were often quite specific when suggesting indicators of success.

Biological measures of success suggested by respondents corresponded closely to standard indicators published in the literature and already commonly used in MPA monitoring (e.g. species abundance, species richness). However, many of the respondent-proposed social and economic measures were novel and innovative, with most of the suggested measures not previously published (Table 4, Table S1). Suggestions ranged from measures that could be implemented and monitored relatively easily and with little cost (e.g., the extent of educational signage around the marine park, amount of funding allocated for marine park management), to measures that would be more challenging and costly to obtain (e.g., levels of misinformation transmitted by local media over time). Incorporating stakeholder-derived indicators into monitoring programs enables the collection and communication of information that directly relates to aspects of success that stakeholders care about. As well as providing useful information on different aspects of success about which managers may not

have thought, using stakeholder suggested measures of success acknowledges stakeholders views, makes the achievement of more equitable success more likely, and encourages buy-in and future support.

Indicators tend to be non-directional (e.g., neither decreasing or increasing over time), however, determining the direction of the measure for quantifying success is important in practice, as perceptions may differ from place to place and among stakeholders. For example, having increased 'levels of scrutiny faced by commercial development applicants within or adjacent to the MPA' would be considered a success by local conservation groups, but may not be considered a success by a state government department tasked with expanding rural development initiatives. The same could be said for coastal real estate or rental prices; increases in price might be considered a success by older generations, who are generally property owners, but not for younger residents who may subsequently be priced out of their local home-owners market.

The level of importance placed upon specific success measures may also vary by community or among stakeholders. The Encounter Marine Park is in a post-implementation, management and monitoring phase. Ideally this management and monitoring should take into account perspectives of different stakeholders and report back on the realised achievements of the park should incorporate how different groups perceive success. Results show that here, this will mean highlighting and enhancing the social and economic successes as much as the ecological. Moreover, this study shows that while the use of standard indicators may be appealing to resource-limited governments, tailoring indicators so they are relevant to local stakeholder groups and developing a broader suite of indicators may be needed to effectively capture the diversity of stakeholders' perceptions of success.

Stakeholder participation in MPA management has to be meaningful to be effective, with clear pathways to impact decisions (Yates, 2018). The co-development of indicators that truly represent the priorities of local stakeholders is one way of enabling meaningful participation, but it will only be achieved through detailed consultation with those stakeholders. While this may be costlier in the short-term, it also provides a number of benefits for management. Consulting stakeholders on how to measure the success of a MPA and incorporating their

suggestions gives stakeholders a voice, encourages participation in management and, when the measures are used, demonstrates that stakeholder input is valued (Elliott et al., 2001; Lundquist and Granek, 2005; McCay and Jones, 2011) all of which should increase support for the MPA. Understanding stakeholder's perceptions of success also gives an insight into their disparate expectations, which can inform management as to those expectations through targeted communication. Given how important community support is for achieving MPA goals (Bennett and Dearden, 2014; Bernstein et al., 2004; Charles and Wilson, 2009), we suggest ensuring sufficient resources are available to develop measures in conjunction with stakeholders and that incorporating suggestions into monitoring plans should be a priority.

4.3 Variation among stakeholder groups

Perceptions as to what constitutes MPA success vary by stakeholder group (Himes, 2007). Our findings here support other studies that have shown a divergence within communities between groups with resource extraction interests (e.g. fisheries) and groups who prioritise conservation (Pomeroy *et al.*, 2006, Carcamo et al. 2014). Here, stakeholders from the fishing industry were more likely to identify economic measures of success than conservation groups. This is no surprise. Fishers are the group most directly affected by the spatial restrictions of MPAs, which can both reduce their income and increase their costs (Yates, 2014). Fishers, being directly financially dependent on access to marine resources are justifiably concerned about the economic implications of MPAs. For many stakeholders fostering sustainable use is the priority (Carcamo et al. 2014). Conservation focused stakeholders not directly dependent on access to marine areas for their livelihood can afford to prioritise the more expansive goals of biodiversity conservation and ecosystem resilience. Neither an economic or ecological priority is more 'correct', they simply reflect the context of a particular stakeholder. An important part of MPA planning and management is understanding and incorporating the priorities of different stakeholder groups, mitigating conflict where possible and meeting objectives at minimum cost (Pendred et al., 2016). Involving stakeholders can contribute to better decisions (Pendred et al., 2016) and reduce the cost of MPA planning solutions (Yates and Schoeman, 2015).

Whilst some priorities and measures of success vary between stakeholder groups, we also found substantial overlap. Members of the fishing community identified biological measures of success, conservation stakeholders identified economic and social measures, and government representatives had the broadest view of success (including measures from all categories). Identification of shared perspectives on success can be a means to resolve conflict, as well as opening up opportunities for innovative solutions to conflict that may result in greater acceptance and meeting of MPA biological goals). Thus, understanding that stakeholders may identify measures of success over and above the purpose of the MPA and understanding how those measures of success vary between groups are essential when planning and managing an MPA. As is acknowledging, as our respondents did, that some successes, primarily biological, are at least partially dependent on achieving other types of success, primarily socio-economic and political.

Effectively communicating monitoring results back to stakeholders is essential to acknowledge and maximise appreciation of successes, as highlighted by respondents in this study. Communication is also important for highlighting where more work is needed to improve the success of the MPA and encouraging communities to contribute. Provision of information around compliance, success stories, and opportunities for engagement were specific aspects requested by our respondents. An absence of information dissemination leads to disquiet and uncertainty, and cynicism. Knowing how stakeholders perceive success will enable communication efforts to focus on aspects that matter most to stakeholders.

Of course, perceptions of success may change over time. It is therefore important to monitor community perception across all stages of MPA development (from implementation onwards). With this in mind it will be beneficial to return to the Encounter Marine Park communities in five and 10 years' time to reassess the perceptions of this group of people to see whether or not their perceptions have changed and what can be learned from that, including which have been the most robust socio-economic indicators of success.

5. Conclusion

What constitutes MPA success is dependent on individual perspectives and local context. Meeting stated objectives is obviously an important aspect of success, yet even where MPAs are designed to achieve one particular goal and that goal is effectively translated to members of the community, the community will likely judge MPA success across a range of different measures, including those that the MPA was not necessarily designed for. Achievement of these different measures of success can be interdependent. Therefore, a broad range of measures of success need to be considered when designing an MPA and developing its monitoring program, including social and economic measures, even if the goal of the MPA is entirely biodiversity conservation. Ideally these measures (indicators) should be developed in conjunction with the stakeholder community.

Communication is the key to attain and maintain the support of communities adjacent to marine parks and thus is an essential aspect of future MPA success. Communication efforts should focus on the issues relevant to those local communities/stakeholder groups, including sharing monitoring results that capture stakeholder relevant indicators of success. Ideally this should be considered at the early stages of MPA designation to maximise the collection and dissemination of as many 'success stories' as possible, and to achieve early wins and local buy-in.

In the end, there are no short cuts when it comes to gaining broad stakeholder buy-in for an MPA. Investment in understanding and incorporating stakeholders throughout planning and management phases is essential, and part of that should involve gathering different stakeholder's perceptions of success. Success (or failure) will consist of a multitude of aspects, many of which will be less tangible and thus more difficult to measure with quantitative monitoring. Capturing stakeholder's perceptions and stories of success (or failure) will help build a fuller picture of the impacts of a given MPA and allow for more holistic adaptive management efforts.

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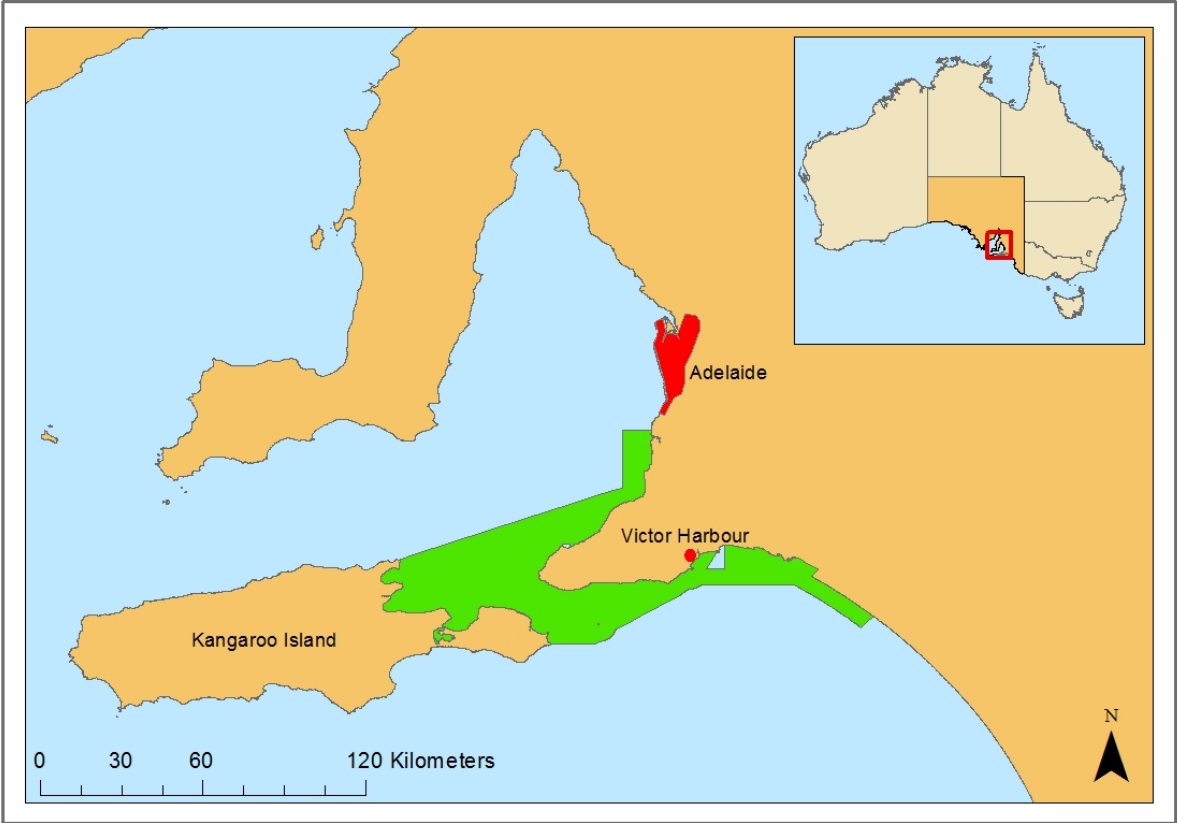
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1017 **Figures**

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1019 **Figure 1.** Map of study site, showing the Encounter Marine Park in green.



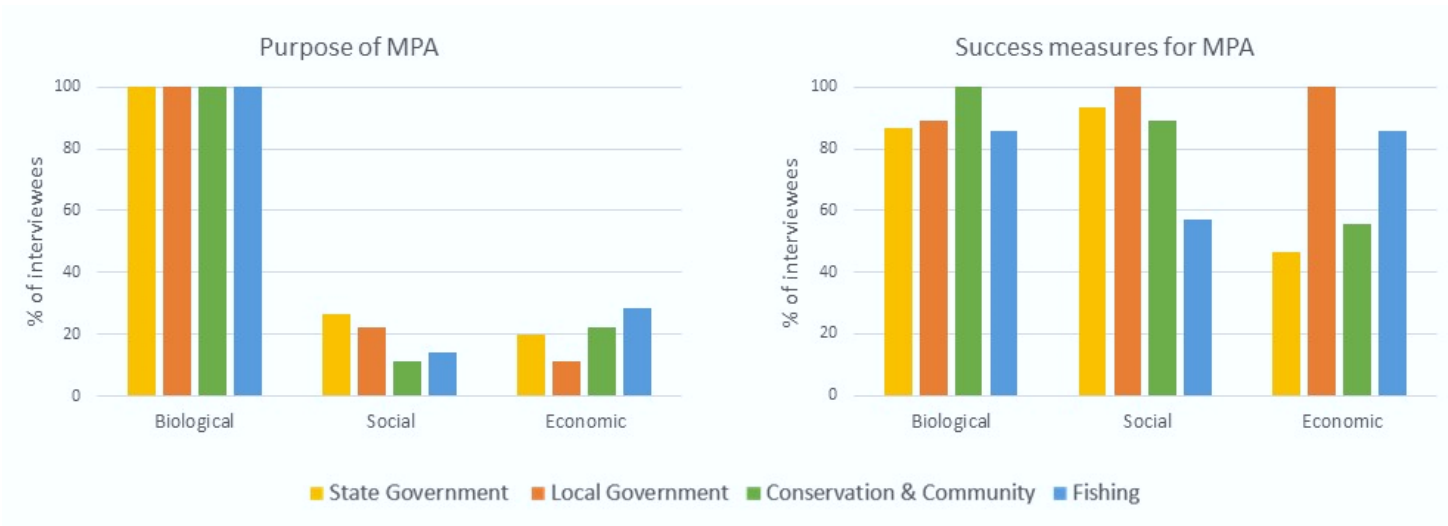
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1023 **Figure 2.** Comparison of interviewees' (n=41) stated purpose of the Encounter Marine Park
1024 and how they would measure success of the MPA.

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1026 Tables

1027 **Table 1.** Composition of the different stakeholder groups and number of individuals
 1028 interviewed. For analysis the private consultant was included in conservation and community
 1029 groups.

Stakeholder Type	Sector/Division/Group	No. interviewed
State Government	Department of Environment Water & Natural Resources Primary Industries & Regions South Australia SA Tourism Commission Department of State Development Department of Transport Natural Resource Management Division	15
Local Government (Mayors, CEOs, Councilors, Environment Officers)	City of Onkaparinga District Council of Yankallilla Alexandrina Council City of Victor Harbor Kangaroo Island Council	9
Conservation and community groups	'Friends of' groups Citizen Science groups Volunteer groups	9
Fisheries	Commercial Fishing Charter Boat Operators Recreational Fishing	7
Private consultant	Marine expertise	1
Total:		41

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1034 **Table 2.** Composition of the four focus groups and locations held.

Location	Stakeholder group	No. attendees
Kangaroo Island	Fishing	7
Kangaroo Island	Conservation Interests	8
Yankallilla	Fishing	8
Victor Harbor	Conservation Interests	9
Total		32

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